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EFFECT OF BANK SIZE ON THE RELATIONSHIP BETWEEN REVENUE DIVERSIFICATION AND PERFORMANCE OF COMMERCIAL BANKS IN KENYA

By: Teimet, P. R[1], Lishenga, L. J. (PhD)[2], Iraya, M. C. (PhD)[3] and Ochieng, D. E. (PhD)[4]

Abstract

Purpose: *The purpose of the study was to establish the moderation effect of firm size on the relationship between revenue diversification and performance of commercial banks in Kenya.*

Methodology: *The paper used unbalanced panel data sourced from Kenya's central bank spanning 2009 to 2018, across 42 commercial banks. Hirschman-Herfindahl model captured the diversification index while return on assets was captured using earnings before interest and tax, over assets. Bank size was proxied using regulatory weighted composite index while the moderation effect was assessed using Baron-Kenny's model.*

Findings*: The study found that the bank size interaction with interest diversification was insignificant (β_3 = .049, P = .836), meaning the absence of moderation effect. Further, the bank size interaction with non-interest diversification was significant (β_3 = -.69, P = .0218), meaning the presence of moderation effect. The results implied that bank size does not moderate the relationship between interest diversification and return on assets; however, moderates the relationship between non-interest diversification and return on assets*

Implication: *The results imply that commercial banks need to step-up their size scale as a mechanism to achieve banks activities' and diversification strategies to improve returns. The size of a bank is an indication of bank's reliance on collected deposits as well as gaining a competitive edge by leveraging on average cost reduction per-unit while enhancing capital base and market share, which ultimately is geared towards withstanding financial shocks.*

Value*: The study adds value to the banking regulators and managers in understanding the influence of bank size and provides a profound pointer in the bank's management and intermediation decision. A supervisory body finds the current study findings useful while undertaking superintendent starring role and production of prudential guiding principle to guide banks on revenue generation activities as well as restriction of banking activities.*

Keywords: *Bank size, moderation effect, revenue diversification, return on assets*

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[1] ***Officer, Central Bank of Kenya (pteimet@yahoo.com)***
[2] ***Professor, University of Nairobi, School of Business, Department of Finance and Accounting***
[3] ***Professor, University of Nairobi, School of Business, Department of Finance and Accounting***
[4] ***Lecturer, University of Nairobi, School of Business, Department of Finance and Accounting***

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Introduction

The banking sector across the world faces many interruptions attributable to the digital revolution, tighter regulation, colossal capital requirements as well as competition from fintech and low-interest rates (Baele et al., 2007). This means that earning a sustainable profit over time becomes a tricky affair in the era of the borderless digital world, where a person interacts with each other freely and uses the social platform to make payments with potentially faster delivery and inexpensive alternative to the traditional banking system. Thus, the capacity to generate sustainable banking returns over time is the first line of defence for a commercial bank against unexpected losses. It strengthens the capital base used to expand the funded activities and to improve future earnings via reinvestment of retained earnings (Almazari, 2014). Bank's failure to sustain profit depletes capital as a loss absorbent and therefore shrinks bank-funded activities. This puts the equity and debt holders at risk, and for stable returns; revenue generation has to be stable over time, perhaps achieved through revenue diversification.

The term revenue refers to gross earnings comprising net interest income, fee and commission income, trading income and other income (Schildbach, 2016). In the sense, money is the core banks product, meaning that the turn over model does not exist, but revenue. Thus, revenue indicates what a bank can offer and what customers' willingly can pay for a services/product. However, sometimes non-banking activities can inflate revenues. That is, banks nowadays hold large stakes in non-bank financial subsidiaries (e.g. insurance), which generates higher book revenues without significant effect on the balance-sheet items and other similar parameters (Tabak, Fazio & Cajueiro, 2011; and Schildbach, 2016). This study focuses on diversification in interest and non-interest incomes as the expansion of commercial banks interest income-bearing activities, to include non-interest income-bearing activities. Put it in another way, revenue diversification is a creation of extra revenue lines via a new or existing business activity, which contributes to the rebalancing of the firm's revenue mix.

Bank sizes refer to the unique capability relating to the banking business and include net assets, market activities and funds possessed and controlled by a bank, and available to its customers (Golan, Krissoff, Kuchler, Nelson, Price, & Kelvin, 2003). The concept of bank size is essential to a bank because it enables diversification of risks across different activities or business segments, enhances managerial competence and some associated gains of economies of scale (Olweny & Shipho, 2011). Small banks can benefit from a more responsive management model, while large banks can face challenges associated with managing complexity. The returns of large banks outperform that for small banks because larger banks enjoy benefits associated with economies of scale, attributable to better decision-making, resourceful domineering, bargaining power, supra financial position and distribution of fixed costs (Golan et al., 2003).

Based on the above augment, it is logical to assume that a diversified bank reports higher return on assets, because of a larger size relative to a small bank in the same environment. The Harry Markowitz (1952)'s Portfolio theory teaches us that the banking world is full of a financial crisis; and that banks need to be diverse from each other to respond differently to different financial inertia. For example, if banks pursue similar business lines the exposure to a given catastrophic event will similarly affect them simultaneously. The problem exacerbates when several small banks operate in related business lines, which exposes them to the same financial shocks. The consequence of

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revenue diversification on the returns on assets in consideration of bank size is unclear. For example, to increase in revenue diversification level, a bank has to expand into different income-generating activities, potentially to improve the bank's earnings. This requires that a bank expands in size both vertically and horizontally. However, such an increase in the level of diversification and activities level seldom occurs without concomitant changes in interest-bearing components, variable inputs, fixed inputs and financing structure of a bank (Stiroh, 2004). Moreover, the banks' expansion into non-interest activities components such as fee-based products and services, reduce earnings volatility via diversification effect and besides, believed to be convenient relatively to interest activities (Sanya & Wolfe, 2011; Lepetit et al., 2008).

In the prediction of both revenue diversification and return on assets, bank size plays a vital role. That is, a forward-looking commercial bank attempts to increase its capacity through consolidation — mergers and acquisitions —to gain a competitive edge over the competition. A bank may leverage on average cost reduction per unit while enhancing capital base and market share. Babalola and Abiola (2013) opined that a larger bank is more influential in strategic decisions, influence upon its stakeholders, competitors and as such more profitable relative to a small bank. Bank size uniqueness in terms of business assets, capital and reserve, customers' deposits, number of active loans and deposits accounts can influence the quality of decisions on the activities undertaken by a bank, which affects the strength of financial performance (Olowokure, Tanko & Nyor, 2015).

Commercial banks in Kenya are heterogeneous in terms of activities' level and scale or size level but homogeneous in terms of products and services. The sector is transitioning to a more disciplined one as evidenced by several reforms initiated by CBK to strengthen financial performance. These reforms include; the issuance of prudent guidelines, changes in the CBK Act, changes in the Banking Act and stringent adherence to the minimum core capital requirement of Ksh.1billion. These reforms have altered the form, capital and reserve, market structure, asset base and operational domain of commercial banks in Kenya. Coupled with the drying up of low-cost funds and stiff competition from banks, non-banks and fintech, the demand for resources has intensified and forced banks to enter into short-term lending. The phenomena have elevated pressure for deposits and other funds, existing and potential customers, investors, financial innovations, new products and services, which provide various fee-based services (Cytonn, 2017). This attests to the belief that profitability pressure would persist for Kenyan banks because of depressed interest rates and significant capital outlays on information, communication and technology investments and higher regulatory requirements. As to whether bank size has any effect on the relationships between returns on assets indicators and revenue sources diversification in Kenya's context remains a puzzle and intellectually appealing. Thus, the need to undertake the current study to demystify the mystery and perhaps address the knowledge gap. The objective of the paper was to assess the moderation effect of bank size on the relationship between revenue diversification and returns on assets. The study had hypothesized based on the decomposed revenue components; interest diversification and non-interest diversification. That is, the two null hypotheses stated that:

H_1 Bank size does not moderate the relationship between interest diversification and returns on assets of commercial banks in Kenya.

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H_2 Bank size does not moderate the relationship between non-interest diversification and returns on assets of commercial banks in Kenya.

Literature review

Several studies have assessed the relationship between financial performance and revenue diversification in different economies. However, the startling academic curiosity is that the developed economies' findings contrast each other. For example, in EU (Chiorazzo, et al., 2008; Sanya & Wolfe, 2011; Gambacorta et al., 2014; and Brighi & Venturelli, 2015) report positive relationship contrasting negative finding (Goddard et al., 2008). In the US (Stiroh, 2004; and De Young & Rice 2004) reported a negative relationship, contrasting positive findings (Saunders, et al., 2016; and De Young & Torna, 2013). In developing market (Teimet et al., 2011; Lepetit et al., 2008; Kiweu, 2012; and Natalia et al. 2016) reported, positive, contrasting negative finding (Mulwa &Kosgei, 2016). Extrapolating the inconsistencies in the context of developing economies may not be valid contextually.

Goddard McKillop and Wilson (2008) evaluated the influence of bank size on a performance-diversification relationship using panel data from the US credit union for the period between 1993 and 2004. The study concluded that diversification in revenue was not useful to large and small credit unions in the USA. Lepetit, Rous and Tarazi (2008) used a data set from 734 banks for the period between 1996 and 2002 to investigate the size effect on the relationship between financial performance and diversification in the EU banking industry. The study found a definite link between diversification and financial performance for smaller banks driven by non-interest income. Muhindi and Ngaba (2018) used panel data from 2012 to 2016 to assess the power of bank size on the financial performance of Kenyan banks. The study found a positive relationship between bank size and financial performance and revealed that larger banks exhibit a higher return on assets relative to medium and small. However, an earlier study by Mulwa and Kosgei (2016) found a negative relationship between bank size and financial performance, which conflict with Muhindi's findings. In an endeavour to examine the influence of both ownership and size on efficiency and performance, Bonin, Hassan, and Watchtel (2004), used a panel data from 225 banks across eleven transitioning countries from 1996 to 2000. The study also observes that efficiency declines with bank size. Abel and Roux (2016), evaluated the relationships among efficiency, bank size and performance of banks in Zimbabwe between 2009 and 2014. The study found that efficiency relates positively to financial performance and economic stability. Janoudi (2014) assessed the influence of efficiency on bank returns using data from 27 banks in EU countries from 2004 to 2010. They argued that banks that had improved in efficiency catch-up related positively with the cost and profit inefficiencies while bank size had a positive influence on financial performance.

Based on the literature potent, no clarity as to whether bank size has any effect on the relationships between diversification in banks revenue and return on assets. Thus, the study proposed bank size as a third (moderator) variable, which alters the relationship between the independent variables and the dependent variable (MacKinnon et al., 2002). The study expects bank size to influence the relationship between revenue diversification and return on assets because a bank with idle resources can opt to diversify into different products and market-based activities. This increases banks size to enjoy economies of

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scale, which significantly affects the business model as well as generating multiple revenues. This ultimately increases banks value for investors while reducing volatility by way of total risk, systematic risk and idiosyncratic risk (Natalia, Kurniawan & First 2016).

Conceptual Framework

The conceptual model guiding the study is as presented in Figure 1.

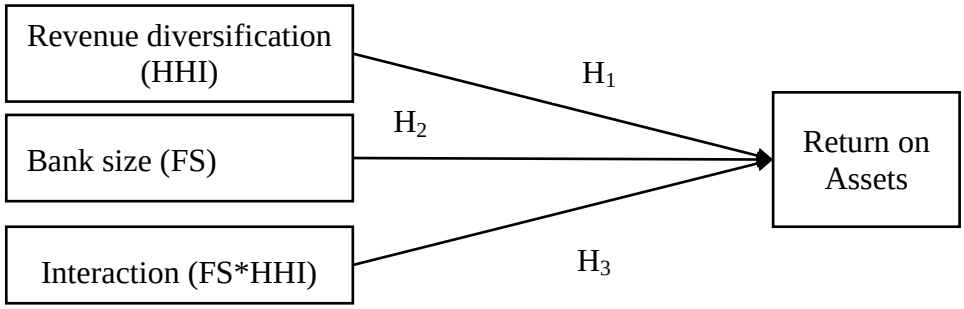

Figure 1 Conceptual model

The arrows in figure 1 show the hypothesized relationship. Generally, the model designates the main relationship (testing for β_1) between revenue diversification and return on assets as depicted by H_1. The relationship (testing for β_2) between bank size and return on assets as depicted by H_2. The bank size and revenue diversification interaction relationship (testing for β_3) as depicted by the path represented by H_3. The moderation effect of bank size occurs if hypothesis H_3, (β_3) is significant whilst H_2 (β_2) is insignificant. For hypothesis H_1, two possibilities bound to happen: if H_1 is insignificant, a complete moderation has occurred whilst significance implies partial moderation occurred (Kim, Kaye, & Write, 2001).

Methodology and Measurement

The study used secondary panel data extracted from the central bank of Kenya (CBK) database stretching from 2009 to 2018 and across 42 commercial banks. This generated forty-two 420 data points. The panel data was appropriate since the study utilized a wide range of statistical panel tests available for analysis, and certainly does not limit the use of specific statistics. More so, a panel data analysis achieves better regression results because it allows for control of unobserved heterogeneity and recognizes cross-sectional as well as time-series dimensions. This ultimately reduces the bias of the estimators as suggested by Kothari (2010).

The study considered a return on assets as the dependent variable. The ratio measures the overall effectiveness of a commercial bank in the utilization of bank's useful business assets. It is a widely used indicator for financial performance in banks and measured using earnings before interest and tax (EBIT) over the average total assets was as shown in equation 1.

$$\text{Return on Assets} = \frac{\text{EBIT}}{\text{TA}} \text{ percentage} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

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Where: EBIT is earnings before interest and tax and TA is total assets.

ROA metric ranges from zero to hundred ($0 \leq ROA \leq 100$). Several studies have adopted the approach in the past (Terziovski & Samson, 2000; Cho & Pucik, 2005; Olusegun et al., 2013; Rozzani & Rahman, 2013; and Almazari, 2014).

The study adopted revenue diversification as the independent variable and measured using the Herfindahl-Hirschman index (HHI). HHI is the sum of squares of exposures as a fraction of total exposure as shown in equation 2.

$$HHI = 1 - \sum_{i=1}^{n} \left(\frac{xi}{Q}\right)^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where: $Q = \sum_{i=1}^{n} xi + \cdots . + xn$ representing the total revenue exposure,
$\sum$ = Sum,
HHI = Revenue diversification index and
X_i = an exposure variable.

The diversification index ranges from zero to one ($0 \leq HHI \leq 1$). Various authors have applied a closely related approach (Staikouras & Wood, 2006; Stiroh, 2004; Stiroh & Rumble 2006; and Chiorazzo et al., 2008).

In the study, the third variable was bank size and assessed as a moderator. Works of literature report bank size indicators from three perspectives: the market indicator, accounting-based and the regulators' indicators. The three scale-lens shows how important it is not to rely on a single measure as the only proxy for bank size because each concept has its weakness and as such, a composite measure, which takes consideration of each category, would be better, comprehensive, comparable and robust. Thus, this paper used a composites index used mostly by banking regulators. The index is a summation of an equal-weighted composite index of 33 percent (33%) of net assets, core capital, and customers' deposit. The remaining one percent (1%) is distributed equally to the number of loan accounts and deposit accounts (CBK, 2018). The model was as shown in equation 3

$$\text{Bank size} = f\ \{.33[NA + CC + CD] + .05\ [LA + DA]\} \ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where: f is the function,
NA is the bank's net assets,
CD is customers' deposits,
CC is the core capital,
LA is the number of loan accounts and
DA is the number of deposit accounts.

The bank size metric ranges from zero to one ($0 \leq FS \leq 1$). Several studies have adopted the related approach to assess bank size (Evgeni, 2012; Laeven, Ratnovski & Tong, 2014; and Al Arif & Awwaliyah, 2018). A moderator is a third variable that has an effect of reducing, enhancing or changes the direction of a relationship between the independent variable and independent variable (Lindley & Walker, 1993). Consideration for a moderator is taken when a relationship is either very strong, but more than often unexpectedly weak and inconsistent (Holmbeck, 1997). According to Baron and Kenny, (1986) when predictor and moderator variables are continuous, multiple regression analyses are used for testing moderating effects. The moderation assessment undertaken was in two phases: Firstly, the joint

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effect of the independent and moderator on the dependent in the absence of the interaction. Secondly, the joint effect of the independent variable and the moderating variable on the dependent variable in the presence of interaction.

Model Specification

The study tested the joint significance of the cross-section effects using sums-of-squares (*F*-test) and the likelihood function (Chi-square test) as shown in table 1. Table 1 shows significant joint cross-section effect (F (44, 372) = 6.28, P = .00) and significant chi-square (χ^2 = 233.2, P = .00). This implies that the study rejected the null hypothesis of fixed effect redundancy and adopted the fixed model.

Table 1: Redundant Fixed Effects Tests

Test cross-section fixed effects			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	6.275190	(44,372)	0.0000
Cross-section Chi-square	233.168904	44	0.0000

Data Stationarity

The paper explored data cointegration order 1(*d*) and stationarity using Levin, Lin & Chu (LCC) and Augmented Dickey-Fuller (ADF) Tests. LCC assumes a common unit root process, while ADF-Fisher assumes an individual unit root process. The panel unit root test results were as shown in Table 2.

Table 2: Panel Unit Root Test

Variable	LCC	Prob.	ADF	Prob.	Cross-section	Obs
ROA	-11.304	0.00	152.368	0.00	42	356
HHI_{II}	-13.301	0.00	175.517	0.00	42	359
HHI_{NII}	-16.147	0.00	226.449	0.00	42	361
FS	-79.047	0.00	120.902	0.003	41	320

Probabilities for Fisher tests computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The table exhibits that all variables had no unit root at levels with significance ($p < .05$) and as such, the data were stationary at a 5 percent significance level with null integration order 1(*0*). This implies that the data was safe without differentiation.

Panel Normality

The study examined the normality for dependent variable graphically using normal histograms as shown in Figures 2.

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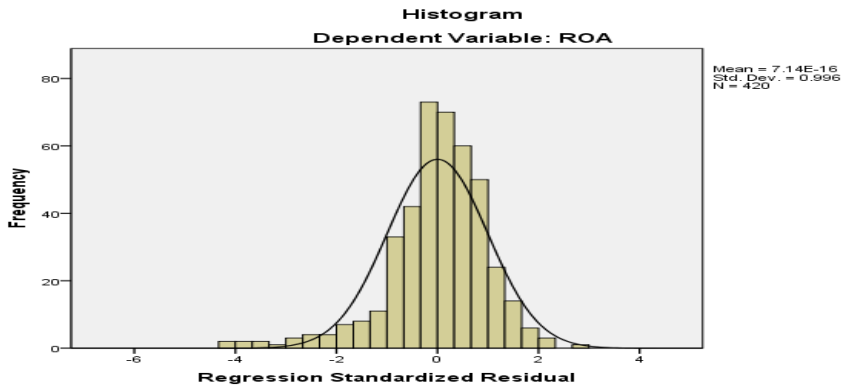

Figure 2: Normality Test for Return on Assets

Figure 2 appears to approximate normal distribution with the peak clustered around zero despite a few extreme spread to the negative side of the histogram. The figure shows a symmetrical shape, meaning the data met normality assumption.

Multicollinearity

The paper used the Variance Inflation Factor (VIF) to assess multicollinearity presence as shown in Table 3. Table 3 discloses that the tolerances were less than one and VIF values were closer to one. Put differently, the variance coefficient inflations for interest diversification, non-interest diversification and bank size were 3.3, 2.9 and 0.9 percent respectively. These show the possible inflation than if there were no multicollinearity with other predictors. This implied that the research data was good for further analysis.

Table 3: Multicollinearity Tests

	Tolerance	VIF
Interest diversifications HHI_{II}	.968	1.033
Non-interest diversification HHI_{NII}	.972	1.029
Bank Size (BS)	.991	1.009

a. Dependent Variable: ROA

Descriptive Statistics

The descriptive statistics were as shown in Table 4.

Table 4: Descriptive Statistics

		ROA	HHI_{II}	HHI_{NII}	FS
N	Valid	420	420	420	420
	Missing	0	0	0	0
Mean		2.33	.356	.636	2.1098
Std. Deviation		2.77	.123	.095	2.58938
Skewness		-.93	-.150	-1.496	1.693
Kurtosis		1.60	-.432	2.628	2.042
Minimum		-8.38	.010	.241	.071
Maximum		10.40	.650	.771	12.231

Table 4 divulges that the mean ($\bar{x}$) scores and standard deviation (σ) for variables. Meaning interest diversification level was 36 percent ($\bar{x} = .356$, σ = 2.7), non-interest diversification was 64 percent ($\bar{x} = .636$) σ = .09 and Return on assets was 2 percent

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($\bar{x} = 2.1$, σ = 2.5). Further, both skewness and kurtosis were within the acceptable range of ±2 and ±3 respectively. All variables exhibit negative skewness, apart from bank size. Apart from interest diversification, which exhibited negative kurtosis, all variables displayed positive. The results imply mild outliers' effect and as such, the data was good for panel regression.

Correlation Analysis

The study assessed the strength of the relationships between variables using Pearson correlation as were presented in Table 5.

Table 5: Correlaion Matrix

		ROA	HHI_{II}	HHI_{NII}	FS	HHI_{II}*FS	HHI_{NII}*FS
ROA	Pearson Corr.	1					
	Sig. (2-tailed)						
HHI_{II}	Pearson Corr.	.118*	1				
	Sig. (2-tailed)	.015					
HHI_{NII}	Pearson Corr.	.164**	.141**	1			
	Sig. (2-tailed)	.001	.004				
FS	Pearson Corr.	.422**	.055	.159**	1		
	Sig. (2-tailed)	.000	.265	.001			
Interaction	Pearson Corr.	-.082	-.500**	-.182**	-.115*	1	
HHI_{II}*FS	Sig. (2-tailed)	.094	.000	.000	.018		
Interaction	Pearson Corr.	-.047	-.168**	-.601**	.258**	.116*	1
HHI_{NII}*FS	Sig. (2-tailed)	.333	.001	.000	.000	.018	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Table 5 validates that return on assets related positively and significant with all variables with exception of the interaction terms. That is interest diversification (r = .118, p = .015), non-interest diversification (r = 0.164, p = 0.001) and bank size (r =.422, p = .000) with statistical significance. The results suggest absence of autocorrelations problems between the variables.

Hypothesis Tests

The objective of the paper was to assess the moderation effect of bank size on the relationship between revenue diversification and return on assets. The study had hypothesized based on the decomposed revenue components: interest diversification and non-interest diversification, which both constituted independent variables. Based on the dichotomy, the study developed two null hypotheses: Firstly, bank size does not moderate the relationship between interest diversification and returns on assets (H_1). Secondly, bank size does not moderate the relationship between non-interest diversification and returns on assets (H_2). As stated earlier, the moderation assessment undertaken was in two phases: Firstly, the joint effect of the independent and moderator on the dependent variable in the absence of the interaction. Secondly, the joint effect of the independent and moderator variables on the dependent variable in the presence of interaction.

Regression of Interest Diversification, Bank size on Return on Assets

In testing the first hypothesis, the study performed a panel regression analysis to assess the joint effect of interest diversification and bank size on return on assets in the absence of interaction. This was important in assessing the influence of bank size on the

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relationship in the absence of the interactive term. The results were as presented in Table 6.

Table 6: Regression Results for Interest Diversification, Bank size and Return on Assets

Dependent Variable: Return on assets (ROA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.522	0.533	-0.979	0.328
HHII	3.453	1.488	2.319	0.020
FS	0.556	0.072	7.708	0.000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.514	Mean dependent var	2.030310
Adjusted R-squared	0.4545	S.D. dependent var	3.760565
S.E. of regression	2.777566	Akaike info criterion	4.986160
Sum squared resid	2877.647	Schwarz criterion	5.438284
Log likelihood	-1000.094	Hannan-Quinn criter.	5.164860
F-statistic	8.588121	Durbin-Watson stat	1.452061
Prob(F-statistic)	0.000000		

Table 6 shows significant coefficients between return on assets and both interest diversification (β_1 = 3.45, t = 2.32, P = .02) and bank size (β_2 = .56, t = 7.71, P = .00) in absence of interactive term. Further, the table reveals that the two variables jointly account for about 51 percent of the variation in return on assets as evidenced by the statically significant predictive model for interest diversification and bank size (R^2 = .514, F (2, 417) = 8.588, P = .000, *d* = 1.5). These results demonstrate that jointly interest diversification and bank size predicts return on assets precisely since the regression coefficient was non-zero ($\beta \neq 0$) and significance (P < .05). The linear predictive model to explain the relationship was as shown in equation 4.

$$ROA_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + (FS)_{it} + \varepsilon_{it}$$
$$ROA = -.52 + 3.45 (HHI_{II}) + .56 (FS) \quad (4)$$

Where : ROA is the predicted return on assets, the dependent variable
: -.52 is the predicted ROA value when both HHI_{II} and FS values are zero,
: 3.45 is the estimate change of HHI_{II} on ROA when FS value is zero,
: .56 is the estimate change of FS on ROA when HHI_{II} value is zero,

Equation 4 implies that for every unit increase change in HHI_{II} and FS, the predicted return on assets increases by 3.45 and .56 respectively. The result demonstrates that jointly interest diversification and bank size predict the return on assets significantly and thus, assessment of the moderation effect would be viable.

The second stage of moderation assessed the independent – moderator interaction effect on the dependent variable. The results were as shown in Table 7.

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Table 7: Regression Results for Interest Diversification, Bank size, Interaction and Return on Assets

Dependent Variable: ROA
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.596305	0.642686	-0.927833	0.3541
Interest diversification (HHI_{II})	3.629641	1.717416	2.113431	0.0352
Bank size (FS)	0.559685	0.074284	7.534365	0.0000
Interaction (HHI_{II}*FS)	0.049076	0.237096	0.206990	0.8361
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.514413	Mean dependent var		2.030310
Adjusted R-squared	0.453062	S.D. dependent var		3.760565
S.E. of regression	2.781136	Akaike info criterion		4.990807
Sum squared resid	2877.316	Schwarz criterion		5.452550
Log likelihood	-1000.069	Hannan-Quinn criter.		5.173309
F-statistic	8.384737	Durbin-Watson stat		1.449810
Prob(F-statistic)	0.000000			

Table 7 reveals that in presence of interaction terms the effect of interest diversification (β_1 = 3.63, t = 2.1, P = .035) and bank size (β_2 = .56, t = 7.53, P = .00) remained positive and significant while the interaction effect was insignificant (β_3 = .049, t = 0.21, P = .84). Further, the model fitness summary showed a statically significant predictive model (R^2 = 0.51, $\bar{R}^2$ = 0.45, F (3, 417) = 8.38, P = .00, *d* = 1.5). This shows that jointly HHI_{II} and FS in the presence of the interactive terms explained about 51 percent of the variation in return on assets. The model results were as presented in equation 5.

$$ROA_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \beta_2 (FS)_{it} \ \beta_3 (HHI_{II}*FS) + \varepsilon_{it}$$
$$ROA = -.596 + 3.63(HHI_{II}) + .56\ (FS) + .049(HHI_{II}*FS) \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where : ROA is the predicted return on assets, representing the dependent variable,
: -.596 is the predicted ROA value when HHI_{II}, FS and interaction values are zero,
: 3.63 is the effect of HHI_{II} on ROA when FS and interaction values are zero,
: .56 is the effect of FS on ROA when HHI_{II} and interaction values are zero,
: .049 is the effect of interaction when HHI_{II} and FS values are zero.

The insignificance of the interaction effects means that moderation effect did not occur and no material change effect observed in the relationship when the interaction was included in the model. In other words, an increase in bank size does not affect the influence of interest diversification on return on assets. Based on these results, the study failed to reject the first sub-null hypothesis (H_1) and concluded that bank size does not moderate the relationship between interest diversification and return on assets.

Regression of Non-Interest Diversification, Bank size on Return on Assets

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The first stage assessed the main effect of non-interest diversification on return on assets in the presence of bank size. This was important in assessing the influence of bank size on the relationship in the absence of the interactive term as shown in Table 8.

Table 8: Regression Results for Non-Interest Diversification, Bank size and Return on Assets

Dependent Variable: Return on Assets (ROA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-1.288644	0.828214	-1.555931	0.1206
Non-interest diversification	3.151538	1.327890	2.373344	0.0181
Bank size	0.564826	0.071228	7.929884	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.514682	Mean dependent var	2.030310
Adjusted R-squared	0.454830	S.D. dependent var	3.760565
S.E. of regression	2.776637	Akaike info criterion	4.985491
Sum squared resid	2875.723	Schwarz criterion	5.437615
Log likelihood	-999.9532	Hannan-Quinn criter.	5.164191
F-statistic	8.599294	Durbin-Watson stat	1.473986
Prob(F-statistic)	0.000000		

Table 8 shows a statistically significant coefficients between the return on assets and both non-interest diversification (β_1 = 3.15, t = 2.34, P = .018) and bank size (β_2 = .56, t = 7.9, P = .000). Further, the effects specification for cross-section fixed statistics reveals a statistically significant F-statistics (R^2 = .51, $\bar{R}^2$ = .45, F (2, 418) = 8.6, P = .000, *d* = 1.5). Based on these results, the study rejected the second sub-null hypothesis (H_2) and concluded that bank size significantly affects the relationship between non-interest diversification and return on assets, but subject to interaction model inclusion in the prediction model. The predictive model equation was as presented in equation 6.

$$ROA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \beta_2 (FS)_{it} + \varepsilon_{it}$$
$$ROA = -1.28 + 3.15 (HHI_{NII}) + .56 (FS) \quad (6)$$

Where : ROA the predicted return on assets, the dependent variable,
: -1.28 the predicted ROA value when HHI_{NII} and FS values are zero,
: 3.15 the estimate change of HHI_{NII} on ROA when FS value is zero,
: .54 the estimate change of FS on ROA when HHI_{NII} value is zero,

Equation 6 demonstrates that for every unit increase in HHI_{NII} and FS, the predicted return on assets increases by 3.15 and .56 units respectively. The result demonstrates that jointly non-interest diversification and bank size predicts return on assets significantly. Therefore, the significance of the relationship implies that assessing the moderation effect was worthwhile.

The second stage of moderation assessed the independent – moderator interaction effect on the dependent variable. The results were as shown in Table 9. Table 9 reveals that in presence of interaction term the effect of non-interest diversification statistics became

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negative and statistically insignificant (β_1 = -.49, t = -.24, P = .81) while both bank size (β_2 = .63, t = 8.2, P = .000) and the interaction effect (β_3 = -.68, t = -2.3, P = .0219) were statistically significant.

Table 9: Regression Results for Non-Interest Diversification, Bank size, Interaction and Return on Assets

Dependent Variable: Return on Assets (ROA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.934029	1.269015	0.736027	0.4622
Non-interest diversification (HHI_{NII})	-0.486897	2.059459	-0.236420	0.8132
Bank size (FS)	0.635211	0.077139	8.234627	0.0000
Interaction (HHI_{NII}*FS)	-0.682669	0.296556	-2.301989	0.0219
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.521498	Mean dependent var		2.030310
Adjusted R-squared	0.461042	S.D. dependent var		3.760565
S.E. of regression	2.760772	Akaike info criterion		4.976109
Sum squared resid	2835.333	Schwarz criterion		5.437852
Log likelihood	-996.9828	Hannan-Quinn criter.		5.158611
F-statistic	8.626084	Durbin-Watson stat		1.506685
Prob(F-statistic)	0.000000			

Further, the effects specification statistics reveals a statistically significant F-statistics (R^2 = .52, $\bar{R}^2$ = .46, F (2, 418) = 8.6, P = .000, *d* = 1.5). The insignificance of non-interest diversification and the significance of the interaction terms effects means that moderation effect occurred. That is, there was significant effect observed on the relationship between non-interest diversification and return on assets in the presence of the interaction term. Based on these results, the study rejected the second sub-null hypothesis (H_2) and concluded that bank size moderates the relationship between non-interest diversification and return on assets. The prediction model equation was as presented in equation 7.

$$ROA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \beta_2 (FS)_{it} \beta_3 (HHI_{NII}*FS) + \varepsilon_{it}$$
$$ROA = .93 + -.49 (HHI_{NII}) + .63(FS) + -.69(HHI_{NII}*FS) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

Where : ROA the predicted return on assets, representing financial performance,
: .93 is the predicted ROA value when HHI_{NII}, FS and interaction values are zero,
: -.49 the effect of HHI_{NII} on ROA when FS and interaction values are zero,
: .63 the effect of FS on ROA when HHI_{NII} and interaction values are zero,
: -.69 the effect of interaction when HHI_{NII} and FS values are zero.

Equation 7 demonstrates that the coefficient (β_3 = -.69) of the product term (HHI_{NII}*FS) on return on assets is negative, which proves that the moderating variable (FS) weakens the effect of non-interest diversification (β_2 = -.49) on returns on assets. In other words, an increase in firm size affects return on assets negatively.

Findings of the Study

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The objective of the paper was to assess the moderation effect of bank size on the relationship between revenue diversification and return on assets. The study had hypothesized based on the decomposed revenue components: interest diversification and non-interest diversification. That is, the two null hypotheses stated that; first bank size does not moderate the relationship between interest diversification and returns on assets; and secondly, bank size does not moderate the relationship between non-interest diversification and returns on assets. As previously mentioned, the analysis was in two stages: firstly was the analysis of the effect of interest diversification and bank size on return on assets in the absence and the presence of interactive terms. As a result, the study found that interest diversification (β_1 = 3.45, P = .029) and frim size (β_2 = .556, P = .000) significantly affect return on assets in absence of interaction terms. When the interaction term was included into the prediction model, both interest diversification (β_1 = 3.63, P = .0352) and bank size (β_2 = .559, P = .000) relationship remained significant while interaction term effect was statistically insignificant (β_3 = .049, P = .836). The insignificance of the interactive terms showed that there was no notable change in the inferential statistics and as such, the moderation effect of a bank size never occurred. Thus, bank size does not moderate the relationship between interest diversification and return on assets. However, the variable relates positively to returns on assets.

Secondly, the study analyzed the effect of non-interest diversification with bank size in the absence and again in the presence interaction term. The study found that non-interest diversification (β_1 = 3.15, P = .018) and frim size (β_2 = .56, P = .00) significantly affected return on assets in absence of interaction terms. When the interaction term was included into the prediction model, non-interest diversification relation became statistically insignificant (β_1 = -.49, P = .813) while bank size (β_2 = .64, P = .00) and interaction term effect were significant (β_3 = -.69, P = .0218). The significance of the interactive terms showed that there was a notable change in the inferential statistics and as such, moderation effect occurred. Thus, bank size moderates the relationship between non-interest diversification and return on assets. In summary, the findings of this study precisely demonstrated that revenue diversification significantly affects financial performance and that bank size moderates non-interest diversification (not interest diversification) and financial performance.

The finding concurs with other previous studies, which found a positive linear relationship between bank size and profitability, but not as a moderator on the relationship between revenue diversification and financial Performance (Lepetit et al., 2008; Muhindi & Ngaba, 2018). Further, the finding supports Jahera, Lloyd and page (1987) assertion that bank size correlates positively with performance through economies of scale. Muhindi and Ngaba (2018) found a positive relationship between bank size and financial performance. The research found that a negative indirect exposure effect for large firms outweighs the positive direct exposure effects, however, inconsistent with those studies, which saw a negative moderation on the relationship between revenue diversification and financial performance (Goddard et al. 2008; Mulwa & Kosgei, 2016). Bank size associates with financial performance through economies of scale and economies of scope and when compared with the small firms, large firms tend to have larger market shares. This is because of the better bargaining power, superior financial position and more efficient cost controls. According to Li and Rwegasira (2008), diversified entities report higher returns because of a larger size than stand-alone ones.

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Conclusions of the Study

The null hypothesis assessed the moderation effect of bank size on the relationship between revenue diversification and return on assets. Firstly, the significance of interest diversification and insignificance of interaction effect implied an absence of moderation effect. Based on the results, the study failed to reject the first null hypothesis (H_1), implying that bank size does not moderate the relationship. Thus, the study concludes that bank size does not moderate the relationship between interest diversification and bank size. Secondly, the insignificance of non-interest diversification and the significance of the interaction terms effects means that moderation effect occurred. Based on these results the study rejected the second null hypothesis (H_2), implying that bank size moderates the relationship between non-interest diversification and return on assets. Thus, the study concludes that bank size fully moderates the relationship between non-interest diversification and return on assets. The repercussion of this stands that commercial banks need to step-up to the optimal and appropriate bank size to ensure operative and proficient planning, investment and working activities that transform into better performance. The size of a commercial bank is an indication of the bank's reliance on collected deposits as well as the extent of involvement in market-based activities. A forward-looking commercial bank attempts to increase its size through mergers and acquisitions to gain a competitive edge over the competition by leveraging on average cost reduction per-unit while enhancing technical efficiency, capital base and market share.

Contributions of the Study

The paper conveys additional contributions by considering the restraining effect of bank size on unique characteristics of financial performance as well as using the composite measure of the bank size. The use of the composite measure assisted in reducing the conflicting tension in methodology and over-reliance on a single size measure indicator. The findings of this study have several contributions to the banking regulators, commercial banks' managers' and shareholders, depositors, borrowers and investors in general. Bank managers and board of management are interested in the direct effect of revenue diversification on bank financial performance. This relationship provided a profound pointer in the bank's management decision process. The fact that a positive relationship existed between revenue diversification and financial performance shows that bank managers' oversight role in banking activities directly influence the bank's financial performance. The larger, diversified commercial bank has a better chance of withstanding a financial shock in one business line and revenue stream as can theoretically balance-out the impact of the inertia with a stable capital and earnings of other business streams. Thus, this begs on the assumption that larger banks indeed diversify in intermediation across a range of business lines. A supervisory body finds the current study findings useful while undertaking superintendent starring role and production of prudential guiding principle on revenue generation activities and restrictions of banking activities. For instance, the bigger size of a bank can be appreciated in the banking business as it enables risk diversification, management competence and scale economies. Small banks can benefit from a more responsive management model and thus, both small and large banks need a level tolerance and close supervision. Therefore, from the regulator's perspective, considerably large size bank complexity requires adequate management and regulatory resources proportionately to

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the size of the bank. The outcomes of this study are valuable to stakeholders—the owners and bearers— of banks obligation and burden of the most significant risk especially when a bank fails to execute as per pledged commitments.

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